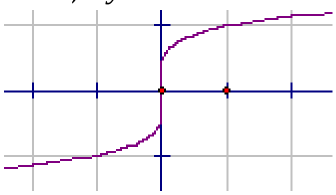
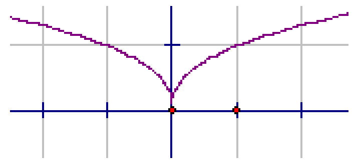
1. Determine whether the graph of each function is symmetric about the y-axis, the origin, or neither:

a) $y = x^{\frac{1}{5}}$



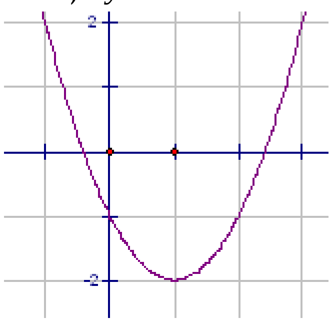
Origin

b) $y = x^{\frac{2}{5}}$



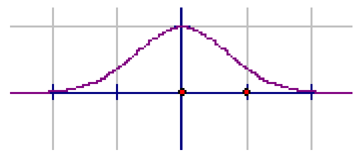
y-axis

c) $y = x^2 - 2x - 1$



Neither

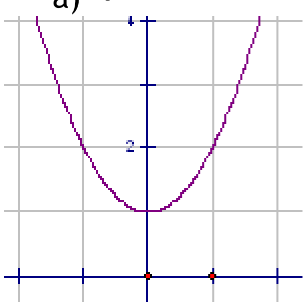
d) $y = e^{-x^2}$



y-axis

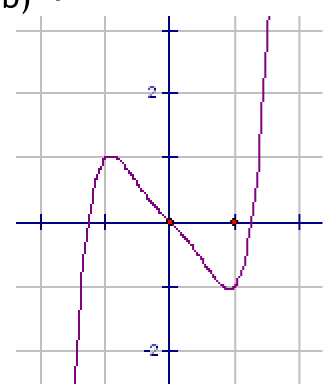
2. Determine whether each function is even, odd, or neither:

a) $y = x^2 + 1$



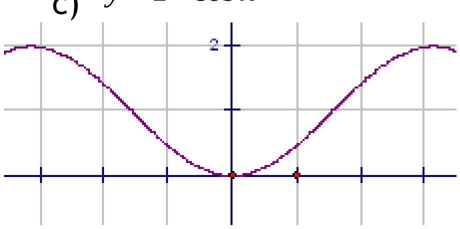
Even

b) $y = x^5 - x^3 - x$



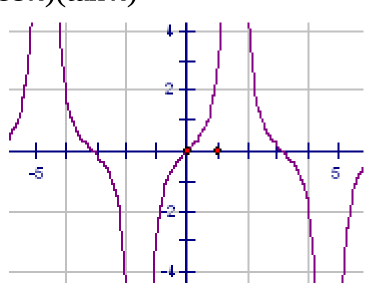
odd

c) $y = 1 - \cos x$



even

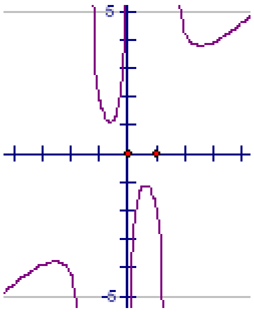
d) $y = (\sec x)(\tan x)$



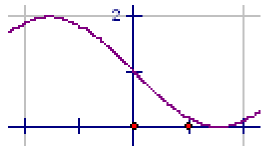
odd

e) $y = \dfrac{x^4 + 1}{x^3 - 2x}$

f) $y = 1 - \sin x$

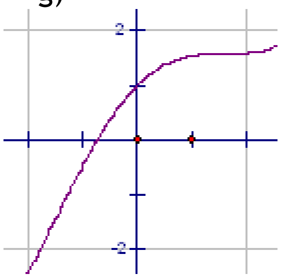


Odd



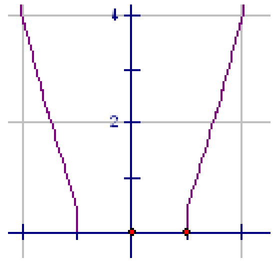
neither

g) $y = x + \cos x$



Neither

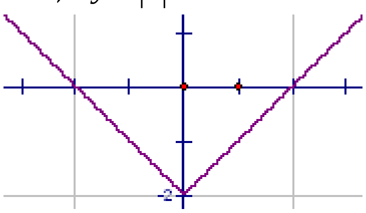
h) $y = \sqrt{x^4 - 1}$



even

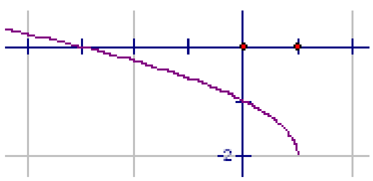
3. For each function below, find the domain, range, and sketch a graph of the function:

a) $y = |x| - 2$



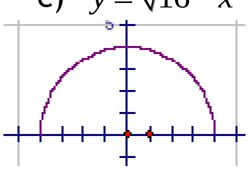
D: $(-\infty, \infty)$
R: $[-2, 0]$

b) $y = -2 + \sqrt{1 - x}$



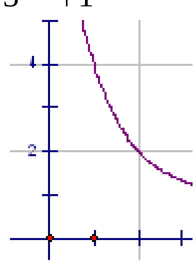
D: $(-\infty, 1]$
R: $[-2, \infty)$

c) $y = \sqrt{16 - x^2}$



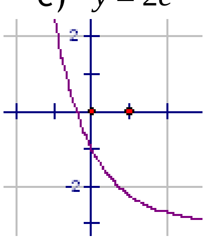
D: $[-4, 4]$
R: $[0, 4]$

d) $y = 3^{2-x} + 1$



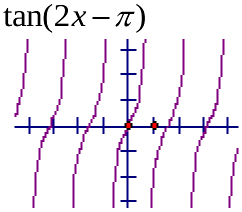
D: $(-\infty, \infty)$
R: $(1, \infty)$

e) $y = 2e^{-x} - 3$



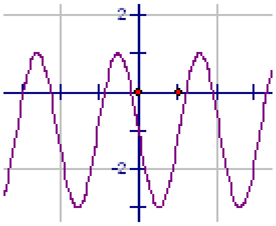
D: $(-\infty, \infty)$
R: $(-3, \infty)$

f) $y = \tan(2x - \pi)$



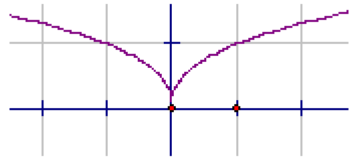
D: $x \neq \frac{3\pi}{4}, \frac{7\pi}{4}, \ldots$
R: $(-\infty, \infty)$

g) $y = 2\sin(3x+\pi)-1$



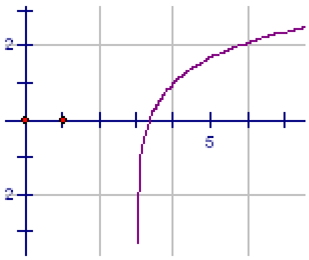
D: $(-\infty,\infty)$
R: $[-3,1]$

h) $y = x^{2/5}$



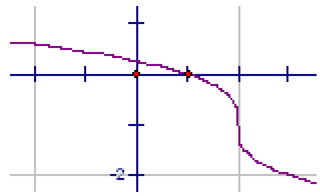
D: $(-\infty,\infty)$
R: $[0,\infty)$

i) $y = \ln(x-3)+1$



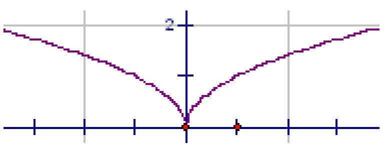
D: $(3,\infty)$
R: $(-\infty,\infty)$

j) $y = -1+\sqrt[3]{2-x}$



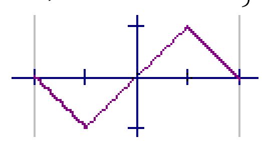
D: $(-\infty,\infty)$
R: $(-\infty,\infty)$

l) $y = \begin{cases} \sqrt{-x}, & -4 \le x \le 0 \\ \sqrt{x}, & 0 < x \le 4 \end{cases}$



D: $[-4,4]$
R: $[0,2]$

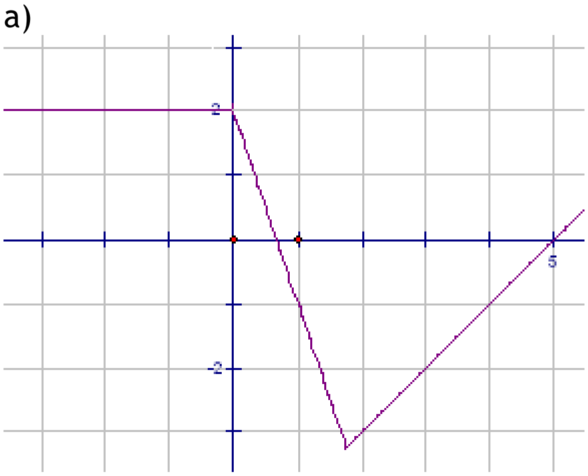
l) $y = \begin{cases} -x-2, & -2 \le x \le -1 \\ x, & -1 < x \le 1 \\ -x+2, & 1 < x \le 2 \end{cases}$



D: $[-2,2]$
R: $[0,2]$

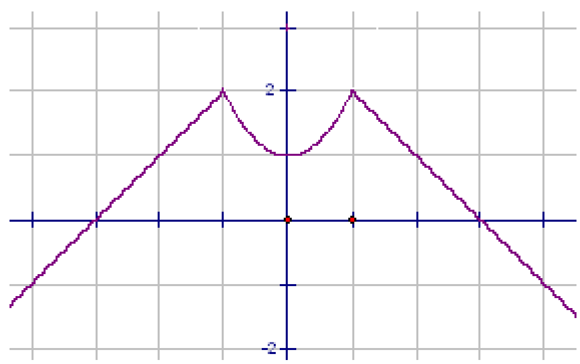
4. Write a piecewise formula for each function below:

a)



$$f(x) = \begin{cases} 2, & x < 0 \\ -3x+2, & 0 \le x \le 1.\overline{6} \\ x-5, & x > 1.\overline{6} \end{cases}$$

b)



$$f(x) = \begin{cases} x+3, & x < -1 \\ x^2+1, & -1 \le x \le 1 \\ 3-x, & x > 1 \end{cases}$$

5. If $f(x)=\frac{1}{x}$ and $g(x)=\frac{1}{\sqrt{x+2}}$, find:

a) $(f\circ g)(-1)$ b) $(g\circ f)(2)$

$f(g(-1))=f\left(\frac{1}{\sqrt{-1+2}}\right)=f(1)=\frac{1}{1}=1$	$g(f(2))=g\left(\frac{1}{2}\right)=\frac{1}{\sqrt{\frac{1}{2}+2}}=\frac{1}{\sqrt{\frac{5}{2}}}=\frac{\sqrt{2}}{\sqrt{5}}$

c) $(f\circ f)(x)$ d) $(g\circ g)(x)$

$f(f(x))=f\left(\frac{1}{x}\right)=\frac{1}{\frac{1}{x}}=x$	$g(g(x))=g\left(\frac{1}{\sqrt{x+2}}\right)=\frac{1}{\sqrt{\frac{1}{\sqrt{x+2}}+2}}$

6. If $f(x)=2-x$ and $g(x)=\sqrt[3]{x+1}$, find:

a) $(f\circ g)(-1)$ b) $(g\circ f)(2)$

$f(g(-1))=f\left(\sqrt[3]{-1+1}\right)=f(0)=2$	$g(f(2))=g(0)=\sqrt[3]{1}=1$

c) $(f\circ f)(x)$ d) $(g\circ g)(x)$

$f(f(x))=f(2-x)=2-(2-x)=x$	$g(g(x))=g\left(\sqrt[3]{x+1}\right)=\sqrt[3]{\sqrt[3]{x+1}+1}$

7. If $f(x)=2-x^2$ and $g(x)=\sqrt{x+2}$, find:

a) a formula for $f\circ g$ b) a formula for $g\circ f$

$f(g(x))=f\left(\sqrt{x+2}\right)=2-\left(\sqrt{x+2}\right)^2$ $=2-(x+2)=-x$	$g(f(x))=g(2-x^2)=\sqrt{(2-x)^2+2}$

8. If $f(x)=\sqrt{x}$ and $g(x)=\sqrt{1-x}$, find:

a) a formula for $f\circ g$ b) a formula for $g\circ f$

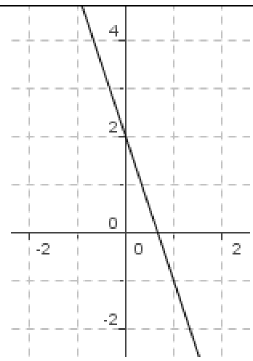
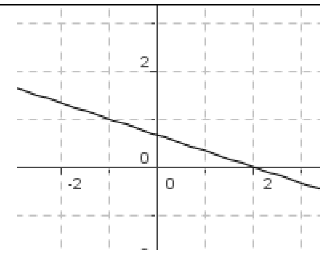
$f(g(x))=f\left(\sqrt{1-x}\right)=\sqrt{\sqrt{1-x}}=\sqrt[4]{1-x}$	$g(f(x))=g\left(\sqrt{x}\right)=\sqrt{1-\sqrt{x}}$

9. If $f(x)=2-3x$, then

a) find $f^{-1}(x)$ and show that $(f\circ f^{-1})(x)=(f^{-1}\circ f)(x)=x$

$f(x)=2-3x$ $3x=2-f(x)$ $x=\frac{2}{3}-\frac{1}{3}f(x)$ $\Rightarrow f^{-1}(x)=\frac{2}{3}-\frac{1}{3}x$	$(f\circ f^{-1})(x)=f\left(\frac{2}{3}-\frac{x}{3}\right)=2-3\left(\frac{2}{3}-\frac{x}{3}\right)=2-2+x=x$ $(f^{-1}\circ f)(x)=f^{-1}(2-3x)=\frac{2}{3}-\frac{1}{3}(2-3x)=\frac{2}{3}-\frac{2}{3}+x=x$

b) sketch a graph of f and f^{-1}.

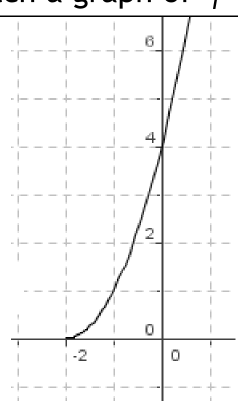
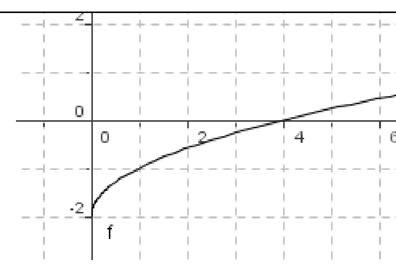
 $f(x)=2-3x$	 $f^{-1}(x)=\frac{2}{3}-\frac{x}{3}$

9. If $f(x)=(x+2)^2,\ x\geq -2$, then

a. find $f^{-1}(x)$ and show that $(f\circ f^{-1})(x)=(f^{-1}\circ f)(x)=x$

$f(x)=(x+2)^2$ $\sqrt{f(x)}=x+2$ $\sqrt{f(x)}-2=x$ $\Rightarrow f^{-1}(x)=\sqrt{x}-2$	$(f\circ f^{-1})(x)=f\left(\sqrt{x}-2\right)=\left(\sqrt{x}-2+2\right)^2=\left(\sqrt{x}\right)^2=x$ $(f^{-1}\circ f)(x)=f^{-1}\left[\left(x+2\right)^2\right]=\sqrt{\left(x+2\right)^2}-2=x+2-2=x$

b. sketch a graph of f and f^{-1}.

 $f(x)=\left(x+2\right)^2,\ x\geq 2$	 $f^{-1}(x)=\sqrt{x}-2,\ x>0$